

Mapping Environmental Contaminants at Ray Mine, AZ

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Abstract:

Airborne Visible and InfraRed Imaging Spectrometer (AVIRIS) data was collected over Ray Mine as part of a demonstration project for the Environmental Protection Agency (EPA) through the Advanced Measurement Initiative (AMI). The overall goal of AMI is to accelerate adoption and application of advanced measurement technologies for cost effective environmental monitoring. The site was selected to demonstrate the benefit to EPA in using advanced remote sensing technologies for the detection of environmental contaminants due to the mineral extraction industry. The role of the Jet Propulsion Laboratory in this pilot study is to provide data as well as performing calibration, data analysis, and validation of the AVIRIS results. EPA is also interested in developing protocols that use commercial software to perform such work on other high priority EPA sites. Reflectance retrieval was performed using outputs generated by the MODTRAN radiative transfer model and field spectra collected for the purpose of calibration. We are presenting advanced applications of the ENVI software package using n-Dimensional Partial Unmixing to identify image-derived endmembers that best match target materials reference spectra from multiple spectral libraries. Upon identification of the image endmembers the Mixture Tuned Match Filter algorithm was applied to map the endmembers within each scene. Using this technique it was possible to map four different mineral classes that are associated with mine generated acid waste.